

Phages/biofilm interaction: strategies to improve phage efficacy against infectious biofilms

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The complex heterogeneous structure of biofilms confers to bacteria an important survival strategy. Biofilms are frequently involved in many chronic infections in consequence of their low susceptibility to antibiotics as well as resistance to host defences. The increasing need of novel and effective treatments to target these complex structures has led to a growing interest on bacteriophages (phages) as a strategy for biofilm control and prevention. Theoretically, the close proximity of cells within the biofilm structure could enhance phage-host interaction and facilitate phage infection. Conversely, the biofilm structure and composition as well as the physiological state of the biofilm cells may be an obstacle to phage infection. Nonetheless, phages have developed mechanisms to overcome biofilm barriers in a natural evolutionary prey-predator model. A thorough characterisation of biofilm/phage interaction and the identification of the weak aspects of biofilms and the strong features of phages are thus important to develop efficient phage-based biofilm control strategies. Phages can be used alone, as a cocktail to broaden the spectra of activity, or in combination with other antimicrobials to improve their efficacy. In this presentation studies involving the use of phages for the treatment or prevention of bacterial biofilms will be summarized, highlighting the biofilm features that can be tackled with phages or combined therapy approaches.